REMARKS

Enclosed is a petition for an extension of time and the appropriate fee.

A clean version of the amended claims is supplied herewith as a courtesy to the Examiner.

Claims 1-6 were rejected under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicants regard as their invention, as the use of parentheses for these claims is improper except in the identification scheme for the crystallographic direction. Claims 3 and 6 are cancelled without prejudice or disclaimer. Claims 1-2 and 4-5 have been amended to remove the improper parentheses. Claims 1 and 2 have been amended to include limitations from the formerly dependent Claims 3 and 6 respectively. Claims 4 and 5 have been amended to replace alumina with a refractory metal oxide that includes alumina and other disclosed refractory metal oxides (Application page 9 ll. 4-7). Claims 7-12 are newly added and are drawn to the formation of the protective metal layer (Application page 14 ll. 16-19). No new matter is added. Claims 1-2, 4-5 and 7-12 remain in the case.

Claims 1-6 were rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. ("Watanabe", U.S. Patent No. 4,306,030). Applicants respectfully traverse.

but is this normal for TiC to exist 5 hm.

Watanabe does not disclose the limitation that "the X-ray diffraction peak intensity ratio of the face (200) of the Ti_3O_5 to the face (111) of titanium carbide is 1% or less." This limitation is a measure of the amount of Ti_3O_5 present in the refractory material of the present invention. The oxygen of Ti_3O_5 reacts with the carbon in the refractory material to form micropores (Application page 11 ll. 18-20). These micropores inhibit the formation of a protective layer (Application page 11 ll. 20-23). Limiting the amount of Ti_3O_5 oxide as claimed allows the formation of a high-melting, protective metal layer on the surface of the carbonaceous materials (Application page 11 ll. 18-23 and page 14 ll. 4-19). Watanabe

discloses that the refractory bricks may be "fitted with metal" at the time of pressing, but does not disclose the formation of a protective metal layer or the quality of adherence of the protective metal layer to the refractory material based on controlling the level of Ti_3O_5 as in the present invention. This limitation is present in amended Claims 1 and 2, and is not taught or implied in the reference. Consequently, it would not have been obvious to one of ordinary skill in the art at the time of the invention to derive all the limitations of Claims 1 and 2 from the cited reference. Claims 4-5 and 7-8 depend from and further limit Claims 1 and 2. Applicants respectfully request this rejection be withdrawn.

New claims 7-12 are drawn to the formation of the protective metal layer (Application page 14 ll. 16-19).

The Watanabe reference represents an attempt to address the problems associated with the infiltration of air and slag into carbon-containing refractory bricks (Watanabe col. 1 ll. 6-22 and col. 2 ll. 25-30) and the destructive impact of the hydration of carbides (Watanabe col. 3 ll. 5-12) in a patent that was issued over twenty years ago. The problem of increasing the useful life of refractory materials still exists in this art. Although Watanabe mentioned in passing that their refractory bricks may be "fitted with metal at the time of pressing," Watanabe neither recognized nor offered a solution to the erosion of refractory materials in the manner addressed by our present claims (Watanabe col. 2 ll. 5-8).

Carbonaceous refractory material is consumed when it contacts with molten iron directly due to the carburizing reaction with iron (Application page 12 ll. 8-11). When the refractory metallic oxides are contained in carbonaceous refractory materials, they remain on the surface of the carbonaceous refractory materials even after the dissolution of the carbon aggregates and stay between the carbonaceous refractory materials and the molten iron to prevent direct contact and reduce the consumption speed of the carbonaceous refractory materials (Application page 12 ll. 11-18). However, the amount of refractory metal oxide,

even though very economical, must be limited to balance the dissolution speed and the slug resistance (Application page 12 line 19 to page 13 line 1). Thus, a supplementary amount of more expensive metallic titanium or titanium compounds are added to completely cover the whole surface of the refractory material with the residual refractory metal oxide layer or the layer of the residual titanium compounds (Application page 13 line 16 to page 14 line 3). In all cases, the x-ray diffraction peak intensity ratio as claimed is essential to allow the protective layer of refractory metal oxide and metallic titanium or titanium compounds to properly form in proximity to the surface of the carbonaceous refractory material (Application page 12 ll. 4-7 and page 14 ll. 4-19). This limitation is not disclosed by Watanabe. Applicants respectfully submit the new claims 7-12 are allowable.

CONCLUSION

In view of above amendments and remarks, it is respectfully submitted that all the claims are in condition for allowance, and such action is earnestly solicited.

If the Examiner believes a telephone interview will be helpful to advance the prosecution of this case, he is respectfully invited to contact the undersigned attorney at the listed telephone number.

Respectfully submitted,

I hereby certify that this document and fee is being deposited on May 30, 2003 with the U.S. Postal Service as first class mail under 37 C.F.R. §1.8 and is addressed to:
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
By: James Lee

Signature

Joseph W. Price
Registration. No. 25,124
SNELL & WILMER L.L.P.
1920 Main St., Suite 1200
Irvine, CA 92614-7230
Telephone: 949/253-4920 (direct)